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The environmental assessment of landfill based on stakeholder analysis

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Abstract

For the current issue that harmful landfill caused serious harm but had passed the environmental assessment, the paper uses the stakeholder analysis theory to analyze the stakeholders of landfill, and find the reasons existed in environmental assessment of landfill based on the simple review of the development and application of stakeholder analysis. And then it gave the countermeasure to the improvement of environmental assessment index system of landfill and the perfection of environmental assessment mechanism.

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keywords: landfill; stakeholder analysis; environmental assessment; countermeasure

1. Introduction

In the world there is about 500 million tons solid waste generated each year and China produces 150 million tons which takes up nearly 30% of total waste of the world and seems to have become the most serious country for the garbage problem. The survey from Ministry of Construction showed that 2/3 of more than 600 cities in the country where is surrounded by garbage, of which 1/4 of the cities are no longer landfill available. Total occupation of municipal solid waste dump is 500 million square meters land, equivalent to 75 acres. Landfills have caused serious pollution to the atmosphere, groundwater and soil and have consumed a lot of land [1]. Even after environmental protection measures the sanitary landfill will produce secondary pollution as well, which will increase the risk of congenital diseases

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such as neonatal low birth weight children, spina bifida disease [2]. The risk for neural tube defects, heart interval malformations, large arteriovenous malformations would be high as well [3]. Landfill will increase the risk of acquired diseases such as respiratory diseases, toxic diseases, cancer and infectious diseases [4], affect

The surrounding vegetation [5]. It also affects some surrounded enterprises which use a quantity of water usually and has a direct impact on the surrounding environment and people's health. The landfills lead to the waste siege phenomenon and affected the development of the city seriously. The hazard of waste landfill is so serious but why did they pass the environmental and to solve this problem, this study found mainly in the following aspects:

- First the government is the participant, approver, evaluator in the construction and operation of the landfill. The planning unit of landfill is the Government Planning Unit, so it approval itself. The environmental assessment agencies are government agencies such as the environmental protection agency, research academy of environmental sciences, etc., or enterprises who have close contact with the government, it assesses itself. This result is certainly in line with the requirements of the environment.
- Second landfill operators and the government are the beneficiaries, landfill nearby residents or businesses are the interests of the losers during environmental assessment, the health of the residents and the development of enterprises have been seriously affected. But exactly that the interests of residents and the related enterprises surrounded are not be taken into account or ignored to some extent, so they lose the largest damage in the process.
- Third former landfill environmental assessments for the landfill usually aimed at the pollution like air pollution, water pollution, soil pollution in line with national standards such as "Solid Waste Landfill Pollution Control Standard", "Municipal Solid Waste Sanitary Landfills Buried Standard "" Solid Waste Landfill Pollution Control Standard "and so on when they made environmental assessment^[6-7]. However, they focus only on monitoring environmental pollution, neglect the great threat to people's lives and health of the landfill pollution by long-term accumulation and enrichment of pollutants, but in the past the index system does not reflect this.

Based on the above issues, this paper attempts to use stakeholder analysis theory to analyze the environmental assessment and the various stakeholders' interests aspirations. Through the form of questionnaires, discussions or individual interviews we obtain all the stakeholders' view to environmental assessment and obtain a comprehensive analysis of the various stakeholders of the benefits and damage. Finally, according to the appeal of all the stakeholders some corresponding countermeasures of the environmental assessment are given to provide some useful ideas for the environmental assessment work.

2. Overview of stakeholder theory

The stakeholder analysis theory is brought forward by the scholar of Stanford Research Institute at 1963, as a management tools it is a new idea against for "shareholder supremacy" has been developed rapidly [8]. Mitchell and Wood summarized the 27 kinds of representative definition since stakeholder analysis has been put forward [8]. In 1984 Freeman's definition to stakeholders has been widely recognized by the academics, that is Stakeholders are those that who can affect the realization of organizational goals or group of individuals affected by the realization of organizational goals [9]. Some scholars of China also have proposed some representative definitions such as Sheng Hua Jia, Honghui Chen [10]. At academics the research of stakeholders' classification are more concentrated in multi-dimensional subdivision and Mitchell scoring at present. The scholar who use multi-cone subdivision classify stakeholders are Freeman [11], Clark Johnson [12] and so on. Freeman conceived that the stakeholders were should be divided into three categories: (1) the ones who hold shares stock, such as

board of directors, managers and so on called ownership stakeholder; (2) groups who have economic exchanges associated with company, such as staff, creditors, inter-service groups, employees, consumers, suppliers, competitors, local communities, management structure and so on called stakeholders in economic dependence. (3) stakeholders who have relationship of society interests with the enterprise, such as government departments, media, special groups called social stakeholders. According to the ways of impact on enterprises Frederick (1988) divided stakeholders into direct stakeholders and indirect stakeholders. Direct stakeholders conclude stockholders, staff, creditors, suppliers, dealers, consumers, competitors. Indirect stakeholders conclude central government, local government, foreign government, social groups, media, the public. According to the closeness between enterprise and relevant groups. Clark Johnson [12] divided stakeholders into primary stakeholders and secondary stakeholders. Primary stakeholders include stakeholders, investor, employees, customers, suppliers and so on. Secondary stakeholders include community, government, media and so on. As the stakeholder theory as an analytical tool has increasingly shown its great advantages and practicality it has been widely introduced into many areas such as corporate social responsibility [13], satisfaction degree assessment of city renewable resources [14], the transaction governance mode of public project [15], natural monopoly of a comprehensive performance evaluation [16], large and complex international projects [17], natural resources management [18]. However, in China its application in waste disposal is not so widespread, but in the other country it has been applied in municipal solid waste disposal extensively [19-22], etc, Francisco (2008) used the AHP combined with stakeholders into the urban management planning taken Boston for example. Oliver (2009) used the stakeholder theory into the area of industrial waste management. Giovanni (2010) used the method of combining the stakeholder analysis with AHP theory to solve the location problem of municipal solid waste disposal facilities. David (2010) used stakeholder analysis theory to research the selection of landfill. Environmental assessment involves a wide range of effects and acts for a long time, stakeholder analysis can take all the various stakeholders included into account to assesses comprehensively and then obtain more objective results.

3. Stakeholder analysis of landfill

3.1. Confirm the stakeholder of landfill

According to the definition of stakeholder analysis made by freeman [23], through collecting extensive information and mastering the basic situation the paper use expert score to definite the stakeholders of landfill. Stakeholders should include government departments (environmental protection department, the department of land), the public, community residents and businesses near the landfill, landfill operator, environmental protection organization, research institutions, and media. The classification of stakeholders made by Clarkson is more practical, that is, in accordance with relevant groups and the closeness of systems the stakeholders are divided into primary stakeholders and secondary stakeholders [24]. Therefore, we can analyze the system's primary stakeholders including relevant government departments, community residents and businesses near the landfill, landfill operators, the public. Secondary stakeholders include research institutions, media, and environmental protection organizations and so on. According to the ultimate condition of benefit and damage to the stakeholders, the stakeholders are divided into three kinds: the beneficiaries of interest, the losers of the interests, the stakeholders of no gain or loss. The beneficiaries of interest include government and related departments, landfill operators, the public. In this article the public are those who produced mass garbage. And the waste was disposed by landfills, the public are put as the interests of beneficiaries here. The losers of Interests is the surrounding residents and businesses affected by the landfill's. The stakeholders of no gain

or loss mainly those secondary stakeholders, their interests in the profit and loss situation is not particularly obvious, including research institutions, media, environmental organizations.

3.2. The relations analysis of stakeholders in landfill

All of the stakeholders in landfills pursue their own interests to access maximize, but at the same time it would be inevitable constrained by the other stakeholders, so all stakeholders can not only pursue their own maximum benefit, otherwise the conflict would be take place. The beneficiaries including landfill operators and government departments are in the dominant position of the prescription among all stakeholders, they have the most control over and grasp the most complete information. The landfill operators are seeking to maximization of the economic benefits as its fundamental goal. They are often in pursuit of economic interests while dispose waste, to some extent government decisions would be influenced. Therefore, the government plan decisions will bring potential impact to the environment, and lead to damage to the interests of the environment of other stakeholders, so that the environmental assessment moot. The situation is more evident in the cities which have serious waste problem. Government bodies (including the environmental protection department, the department of land) should pay more attention to quality of landfill operation and the healthy living of affected people. And in the construction and operation of landfill the government confronts the enormous pressure of garbage disposal and the need for urban development which lead to it keep a attitude of acquiescence to the construction of the landfill operation to a certain extent. In this way, the government planning departments and environmental assessment departments (including government-affiliated units), make the results of the environmental assessment in line with national regulations driven by the economic interests or political pressure, the case of the Summer Palace impermeable membrane is a typical lesson [25].

3.3. The stakeholders analysis and the benefit appeals of stakeholders in landfill

3.3.1. The stakeholders analysis and the benefit appeals of stakeholders in landfill

(a) The indicators of environmental assessment were too one-sided which result in not fully measure the effectiveness. On the aspect of environment impact, the assessment indicators mainly focus on the microscopic field such as checking whether the major components of the main contaminants in line with national standards. But it neglects or avoids its long-term accumulation and migration effect of environmental pollution, a large wide of effect, a long time of action which lead severely influence to the health of residents nearby, development of related enterprises nearby and the ecological balance.

(b) Lack of strict monitoring mechanism. As driven by economic interests or political pressure forced, even sanitary landfill construction and operation passed through the environmental assessment, in its future operation it cannot be strictly in accordance with relevant regulations.

3.3.2. The role of stakeholder analysis in landfills

Waste problem has restricted urban development largely, for the relatively mature waste disposal technology, and large capacity, so the current approach of landfill is applied in most cities. The accurate and objective analysis to the landfill stakeholders has a huge role for the harmonious development of the city, strengthen the government's credibility, coordination of economic and social environment. In addition, analysis of the landfill can be more clearly recognize the surrounding environmental social impact of landfill and cause the initiative of various stakeholders to promote the city waste disposal better.

3.3.3. Appeal of stakeholder interests

Relevant government departments: their views about the landfill operation on the impact is acquired by the way of discussion primarily. As the beneficiaries of interests, the government departments consider landfill can relief the growing garbage crisis, and help people live and work happily and the development of cities. Government is well aware that the landfill will cause serious impact on the environment, and bring pressure to saving energy and reducing emissions of the city, reduce the credibility of government, to the government's image as early as adverse effects, bring about adversely affect to the government's image. However, the government said that all of the landfills must be passed through environmental assessment before its construction and operation. And the sanitary landfill has the largest capacity and it is the most effective way to mitigate garbage crisis. If the waste problems are not resolved, the city could not develop or even under the condition of threat, so the utilization of landfill is also the necessary measures to take for the urban development.

Landfill operator: its view about the landfill operation on the impact is acquired by the way of discussion primarily. As the beneficiaries of interests. First operation of landfill can increase its profits and enhance its competitiveness and the corporate brand in the industry. And it promise that the landfill must be run in accordance with national standards to meet environmental requirements in the process of landfill operations. It stress that its mission is to solve the growing waste crisis and create a good condition for the rapid and healthy development of the city.

Affected residents and related business: their views about the landfill operation on the impact are acquired by the way of individual interview and questionnaire primarily. As the losers of interests, affected residents are most concerned about whether the contamination on the air, soil and groundwater from the landfill operation can reach the national standards or not. They worried if this will bring adverse effects to their healthy and the growing of crops or lead to some diseases for a long time living. They also said whether the landfill operation can run in strict accordance with national standards as they promised. Related businesses around the landfill such as companies who use a lot water are worried about pollution on groundwater of landfill, so they are most concerned about whether the groundwater or surface water receipt contamination or meet the standards of national standards. The staff is very concerned is their health hazard caused by air pollution about waste landfill on the environment.

Research institutions: its view about the landfill operation on the impact is acquired by the way of discussion primarily. As the stakeholders of no gain or loss, undoubtedly their point of view is the most scientific the most objective. They consider that the garbage disposal situation is indeed serious, most of the cities have appearance the garbage siege phenomenon, only landfill has a huge of processing capacity and relatively mature technology which can more effective mitigate garbage crisis. But the most important aspects is that the landfill consume a considerable amount of land that make China which is lacking in land resources confronts more pressure. Landfill usually would not meet the requirements or in accordance with standards in the operation and even if the landfill meet the relevant standards it is also pollute the atmosphere, water, soil pollution to some extent, it is bound to have a serious impact such as the incidence of certain diseases much higher than other regions, crop failures, loss of biodiversity, ecological destruction. Especially some pollutants will be long-term accumulation, migration and enrichment to affect broader, longer duration of action, the greater the risk.

Environmental protection organization: its view about the landfill operation on the impact is acquired by the way of discussion and questionnaire primarily. As the stakeholders of no gain or loss, they have no interests with landfill and their analysis to the problem often more objective. Environmental protection organization are most concerned about the landfill's impact on the environment, but most stand firmly and not driven for the benefit easily. They hope to strengthen the publicity of environmental protection and use media to raise public environmental awareness, moral awareness to improve the deteriorating environment for the survival of mankind. They do not have much power and their forces are relatively weak. Their view is lack of scientific basis and cannot make prevention and control of pollution. They

also worry that the landfill will not strictly in accordance with planning and implementation in the sham driven by economic interests.

The public: its view about the landfill operation on the impact is acquired by the way of discussion and questionnaire primarily. The garbage from the public is disposed by the landfill, so the public can be regarded as the beneficiaries of interests. They said the landfill dispose waste is beneficial to them. Compared to concern about whether the landfill can meet national technical requirements, they concerned more about whether the landfill is in accordance with standards.

They worry about that landfill may not meet environmental requirements because of the economic interests, and the government will relax the supervision to the operation of landfill for the pressure of disposing garbage or the gray interests. Thus it will lead to serious adverse effects to the ecological environment and also will reduce the credibility of the government.

The media: its view about the landfill operation on the impact is acquired by the way of discussion primarily. Media is a disseminator of society information, but also have the social responsibility. At a large extent the public is often through the media to obtain this information. Media's attention is often focused on social issues such as waste disposal problem. About landfill the media's focus is the environmental pressure from garbage siege and the effects of urban construction from landfill. Their reports can give a strong pressure of public opinion, and thus to put pressure on the government to monitor the landfill operation strictly, but also encourage enterprises to maintain their own image to be strict with themselves.

4. The countermeasures to the environmental assessment of landfill

4.1. The stakeholders analysis and the benefit appeals of stakeholders in landfill

The environmental evaluation system of landfill the indicators should be designed in accordance with the interests of all stakeholders and take the affected residents' healthy living in an important position to evaluate comprehensively. Firstly the indicators which have different dimension and reflect the different aspect of evaluation should be treated with dimensionless and thus take the pollution and affected residents and related enterprises into account.

During the standardization of indicators, the most commonly used method is the use of statistical analysis, for any one indicator, the score is:

$$z_x = \frac{x - E_x}{\sigma_x} \quad (1)$$

Including: E_x and σ_x are the expectations and standard deviation of the indicators.

For normally distributed random variables, this is equivalent to translate them into standard normal distribution. With this standardized method, the actual scores is expressed as: "The current value of index is equivalent to the number of standard deviations changed from expectations". In the interpretation, if the is lower than expectation, the score is negative; if is higher than expectation, the score is positive. And thus any indicator can be converted into homogeneous scores and can be weighted to the index composition. Now the left question is how to definite E_x and σ_x . And the landfill have cumulative effects to the environment pollution and the healthy living, so we should not only take monitoring for one moment or several times during a period. This paper argues that using the mean and standard deviation calculated from data over the past several years as the both approximation. As the calculation of standard deviation, we are difficult to find a method which is better and has fewer dispute, the only thing should be

defined is how many years data should be use. According to the available of the date of China, we suggest that the calculation of standard deviation is begin from the data from the operation of landfill. For the expectation, the mean of over N years can be applied, that is to say:

$$E_x = \frac{\sum_{i=1}^N x_{t-i}}{N} \quad (2)$$

Including: t is the present, N is the time since the landfill constructed.

4.2. The perfect of the environmental assessment mechanism

4.2.1. Strengthen public participation, improve the mechanism for public participation

The public refereed in the paper is all of the stakeholders. Through the kinds of questionnaire (including online questionnaires), individual interview, discussion, expert argumentation and so on the paper analyzed the landfill from many aspects and especially stress the risk of live healthy of affected resident and the depravation of ecological environment surrounding the landfill from the accumulation of landfill and the pollutant's enrichment and migration. Contrast to economics benefits, the security if life should be more significant.

4.2.2. Change the situation of government evaluate themselves and enhance the fairness of third-party environmental assessment agency.

During the construction and operation of the landfill, the government is the beneficiaries, but also planners even evaluators, as it is often leads to loss of objectivity and impartiality of the environmental assessment or even a mere formality. Even third-party evaluation of landfill, in the face of economic temptation and political pressure they are often commissioned by the government or the landfill operator commissioned which often cannot guarantee the scientific nature of the assessment. So in order to change the situation of government evaluate itself fundamentally, the paper suggest take the environmental quality including environmental quality of landfills as an indicator of political achievements of government performance. The other advice is to strengthen the constraint to third-party environmental agencies and make the qualification standards of environmental assessment agencies diversity.

4.2.3. Strengthen the research of environmental assessment

In China environmental assessment of landfill work has gradually carried out at present. But there are many deficiencies, in addition to a wide range of landfill impact, and long time action, but the cumulative effect of an impact, and in addition to this a very important aspect is that academic accumulation is not enough. So it is necessary to strengthen the academic research about environmental assessment of landfill. This paper argues that the landfill environmental assessment can be reinforced from the following aspects: firstly, in accordance with national requirements and all the vital interests of stakeholders, the evaluation system should be designed objectively and fairly. Second, we should focus on the research of evaluation methods, in combination with other areas of environmental assessment methods and actual conditions of landfill, exploring environmental assessment method about landfill constantly. Third, The other aspect of research should be strengthened is the government how to establish a good oversight mechanisms for the landfill environmental assessment.

5. Conclusion

The paper used the stakeholder analysis theory to analyze the problem about the evaluation system and evaluation work of landfill environmental assessment through the description of the problem. The paper

found the foundational reason and gave the countermeasures which conclude the standardization of dimension and perfecting the environmental assessment mechanism.

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